§ 87.11 Standard for fuel venting emissions.

(a) No fuel venting emissions shall be discharged into the atmosphere from any new or in-use aircraft gas turbine engine subject to the subpart. This paragraph is directed at the elimination of intentional discharge to the atmosphere of fuel drained from fuel nozzle manifolds after engines are shut down and does not apply to normal fuel seepage from shaft seals, joints, and fittings.

(b) Conformity with the standard set forth in paragraph (a) of this section shall be determined by inspection of the method designed to eliminate these emissions.

Subpart C—Exhaust Emissions (New Aircraft Gas Turbine Engines)

§ 87.20 Applicability.

The provisions of this subpart are applicable to all aircraft gas turbine engines of the classes specified beginning on the dates specified.

§ 87.21 Standards for exhaust emissions.

(a) Exhaust emissions of smoke from each new aircraft gas turbine engine of class T8 manufactured on or after February 1, 1974, shall not exceed: Smoke number of 30.

(b) Exhaust emissions of smoke from each new aircraft gas turbine engine of class TF and of rated output of 129 kilonewtons thrust or greater, manufactured on or after January 1, 1976, shall not exceed:

$SN=83.6(r0)^{-0.274}$ (r0 is in kilonewtons).

(c) Exhaust emission of smoke from each new aircraft gas turbine engine of class T3 manufactured on or after January 1, 1978, shall not exceed: Smoke number of 25.

(d) Gaseous exhaust emissions from each new commercial aircraft gas turbine engine shall not exceed:

(1) Classes TF, T3, T8 engines greater than 26.7 kilonewtons rated output:

(i) Engines manufactured on or after January 1, 1984:

Hydrocarbons: 19.6 grams/kilonewton rO.

(ii) Engines manufactured on or after July 7, 1997.

Carbon Monoxide: 118 grams/kilonewton rO.

(iii) Engines of a type or model of which the date of manufacture of the first individual production model was on or before December 31, 1995 and for which the date of manufacture of the individual engine was on or before December 31, 1999.

Oxides of Nitrogen: (40 + 2(rPR)) grams/kilonewtons rO.

(iv) Engines of a type or model of which the date of manufacture of the first individual production model was after December 31, 1995 or for which the date of manufacture of the individual engine was after December 31, 1999:

Oxides of Nitrogen: (32 + 1.6(rPR)) grams/kilonewtons rO.

(v) The emission standards prescribed in paragraphs (d)(1) (iii) and (iv) of this section apply as prescribed beginning July 7, 1997.

(vi) Engines of a type or model of which the date of manufacture of the first individual production model was after December 31, 2003:

(A) Engines with a rated pressure ratio of 30 or less:

(*1*) Engines with a maximum rated output greater than 89 kilonewtons:

Oxides of Nitrogen: (19 + 1.6(rPR)) grams/kilonewtons rO.

(*2*) Engines with a maximum rated output greater than 26.7 kilonewtons but not greater than 89 kilonewtons:

Oxides of Nitrogen: (37.572 + 1.6(rPR) − 0.2087(rO)) grams/kilonewtons rO.

(B) Engines with a rated pressure ratio greater than 30 but less than 62.5:

(*1*) Engines with a maximum rated output greater than 89 kilonewtons:

Oxides of Nitrogen: (7 + 2(rPR)) grams/kilonewtons rO.

(*2*) Engines with a maximum rated output greater than 26.7 kilonewtons but not greater than 89 kilonewtons:

Oxides of Nitrogen: (42.71 + 1.4286(rPR) − 0.4013(rO) + 0.00642(rPR × rO)) grams/kilonewtons rO.

(C) Engines with a rated pressure ratio of 62.5 or more:

Oxides of Nitrogen: (32 + 1.6(rPR)) grams/kilonewtons rO.

(vii) The emission standards prescribed in paragraph (d)(1)(vi) of this section shall apply as prescribed beginning December 19, 2005.

(2) Class TSS: Engines manufactured on or after January 1, 1984:

Hydrocarbons=$140(0.92)^{rPR}$ grams/kilonewtons rO.

(e) Smoke exhaust emissions from each gas turbine engine of the classes specified below shall not exceed:

(1) Class TF of rated output less than 26.7 kilonewtons manufactured on or after (one year from date of publication):

$SN=83.6(ro)^{-0.274}$ (ro is in kilonewtons) not to exceed a maximum of SN=50.

(2) Classes T3, T8, TSS and TF of rated output equal to or greater than 26.7 kilonewtons manufactured on or after January 1, 1984:

$SN=83.6(ro)^{-0.274}$ (ro is in kilonewtons) not to exceed a maximum of SN=50.

(3) Class TP of rated output equal to or greater than 1,000 kilowatts manufactured on or after January 1, 1984:

$SN=187(ro)^{-0.168}$ (ro is in kilowatts)

(f) The standards set forth in paragraphs (a), (b), (c), (d), and (e) of this section refer to a composite gaseous emission sample representing the operating cycles set forth in the applicable sections of subpart G of this part, and exhaust smoke emissions emitted during operations of the engine as specified in the applicable sections of subpart H of this part, measured and calculated in accordance with the procedures set forth in those subparts.

[47 FR 58470, Dec. 30, 1982, as amended at 49 FR 31875, Aug. 9, 1984; 62 FR 25365, May 8, 1997; 70 FR 69686, Nov. 17, 2005]

EFFECTIVE DATE NOTE: At 77 FR 36381, June 18, 2012, § 87.21 was amended by adding introductory text, revising the section heading and paragraphs (d)(1)(iii), (d)(1)(iv), (d)(1)(vi) introductory text, (e)(1), and (f), effective July 18, 2012. For the convenience of the user, the added and revised text is set forth as follows:

§ 87.21 Exhaust emission standards for Tier 4 and earlier engines.

This section describes the emission standards that apply for Tier 4 and earlier engines that apply for aircraft engines manufactured before July 18, 2012 and certain engines exempted under § 87.50. Note that the tier of standards identified for an engine relates to NO_X emissions and that the specified standards for HC, CO, and smoke emissions apply independent of the changes to the NO_X emission standards

* * * * *

(d) * * *

(1) * * *

(iii) The following Tier 0 emission standard applies for engines of a type or model of which the date of manufacture of the first individual production model was on or before December 31, 1995 and for which the date of manufacture of the individual engine was on or before December 31, 1999.

Oxides of Nitrogen: (40 + 2(rPR)) grams/kilonewton rO.

(iv) The following Tier 2 emission standard applies for engines of a type or model of which the date of manufacture of the first individual production model was after December 31, 1995 or for which the date of manufacture of the individual engine was after December 31, 1999:

Oxides of Nitrogen: (32 + 1.6(rPR)) grams/kilonewton rO.

* * * * *

(vi) The following Tier 4 emission standards apply for engines of a type or model of which the date of manufacture of the first individual production model was after December 31, 2003:

* * * * *

(e) * * *

(1) Class TF of rated output less than 26.7 kilonewtons manufactured on or after August 9, 1985:

$SN = 83.6(rO)^{-0.274}$ (rO is in kilonewtons) not to exceed a maximum of SN = 50.

* * * * *

(f) The standards in this section refer to a composite emission sample measured and calculated in accordance with the procedures described in subpart G of this part.

§ 87.23 Exhaust emission standards for Tier 6 and Tier 8 engines.

This section describes the emission standards that apply for Tier 6 and Tier 8 engines. The standards of this section apply for aircraft engines manufactured on or after July 18, 2012, except where we specify that they apply